

Effect of Molecular Geometry on the Liquid-Liquid Equilibrium of Binary Non-Aqueous Liquid Mixtures. Alkane + Alcohol, Alcoxyalcohol, Diol or Polyether Systems

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We are interested in the phase and surface behavior for binary mixtures of linear, branched and cyclic alkanes with alcohol and/or ether compounds formed by molecules with a linear, branched or cyclic structure. In this work we present results of the liquid-liquid equilibrium LLE for some linear polyethers (dimethyl ethers of oligomers of ethylene glycol), cyclic polyethers (crown ethers) alcohol or diol alkane systems. For some of these systems, surprisingly, there are few such studies [1,2,3].

Solubility temperatures T_s of each mole fraction were determined using a He-Ne laser after repeated slow heating and cooling cycles with a similar procedure mentioned in the literature [4]. Temperature was measured by using a RTD probe calibrated and traceable to NIST. The reproducibility of the solubility temperatures was better than 0.03 K. The set of results T_s vs. X for each system was analyzed via non-linear least squares fits to an empirical equation to evaluate the critical parameters of the LLE (T_c & X_c) as has been done in the literature [4]. As a sample of our results, we found $T_c = 297.49$ K and $X_c = 0.765$ for 1,2-hexanediol + n-octane, $T_c = 290.33$ K and $X_c = 0.761$ for 1,2-hexanediol + 2,2,4-trimethylpentane, $T_c = 276.57$ K and $X_c = 0.516$ for 2,5,8,11-tetraoxadecane + 2,2,4,6,6-pentamethylheptane and $T_c = 297.23$ K and $X_c = 0.471$ for 2,5,8,11,15-pentaoxadecane + 2,2,4,6,6-pentamethylheptane. We analyze our results in terms of regular solution models.

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